



2008. M72

**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

**LEAVING CERTIFICATE EXAMINATION, 2008**



**ENGINEERING – MATERIALS AND TECHNOLOGY**

(Ordinary Level – 200 marks)



**FRIDAY, 20 JUNE, MORNING 9:30 – 12:00**

Answer **Sections A and B** of **Question 1** and **three** other questions.

**OVER→**

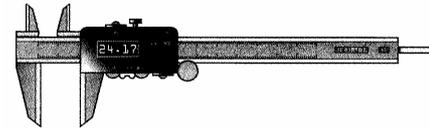
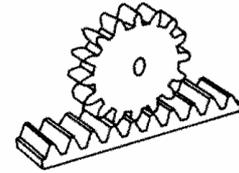
**Question 1.**

**(65 marks)**

**SECTION A - 30 marks**

Give **brief** answers to **any six** of the following:

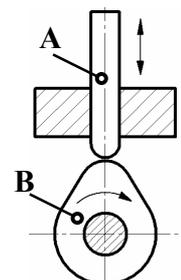
- (a) List **two** safety precautions to be observed when heating and forming plastics.
- (b) State the purpose of the coloured bands on the fixed resistor shown.
- (c) Identify **any two** copper alloys.
- (d) Give **one** example of the application of a rack and pinion mechanism.
- (e) Explain the term *clearance fit* between a shaft and a hole.
- (f) Name **two** types of thread forms.
- (g) What is meant by the term Computer Numerical Control (CNC)?
- (h) Name the measuring instrument shown and give **one** application of its use.



**SECTION B - 35 marks**

Answer **any three** of the following:

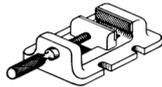
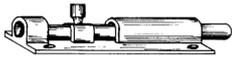
- (i) Describe the function and operation of **any one** of the following:  
Four-jaw independent chuck, Ratchet and pawl mechanism, Feeler gauge.
- (j) Explain **any two** of the computing terms:  
Network, Memory stick, Scanner, DVD.
- (k) Define tensile strength in relation to the properties of metals and give **one** application where a metal needs to be strong in tension.
- (l) Explain **any two** of the terms:  
Pulley drive, Printed circuit board (PCB), Worm gear, Plug gauge.
- (m) Name the mechanism shown and identify **any one** of the parts labelled A and B.



**Question 2.**

**(45 marks)**

- (a) (i) Name **two** modern furnaces used for the production of steel.  
(ii) Make a sketch of **any one** of the furnaces identified at 2(a)(i) and explain its operation.
- (b) Name suitable materials used to manufacture **any three** of the following:
- (i) Door bolt,                      (ii) Machine vice,                      (iii) Kitchen sink,                      (iv) Tap.

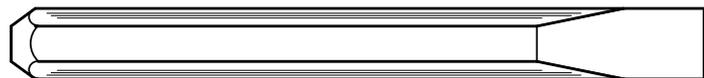


- (c) Identify **any three** of the following metals as ferrous or non-ferrous:
- (i) Steel,                      (ii) Aluminium,                      (iii) Cast Iron,                      (iv) Copper.
- (d) State **one** type of metal used as a protective coating on steel.

**Question 3.**

**(45 marks)**

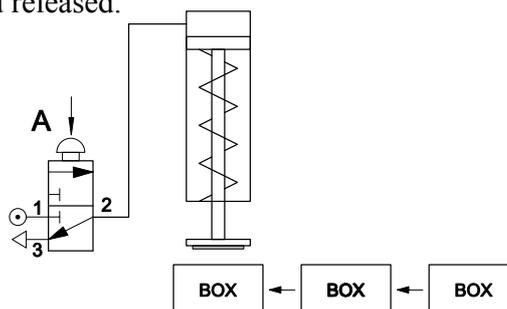
- (a) Describe the changes in the mechanical properties of high carbon steel:
- (i) if it is heated to a cherry red and cooled **quickly**;
- (ii) if it is heated to a cherry red and cooled **slowly**.
- (b) Identify the different heat treatments applied to: (i) the head and (ii) the cutting edge of a cold chisel, as shown.



- (c) Identify **two** safety precautions to be observed when using oil for cooling during heat treatment.
- (d) Describe the *case hardening* process which can be carried out on low carbon steel.

**OR**

- (d) A pneumatic circuit used to stamp boxes is shown. Explain what happens when push button **A** is pressed and released.



**Question 4.**

**(45 marks)**

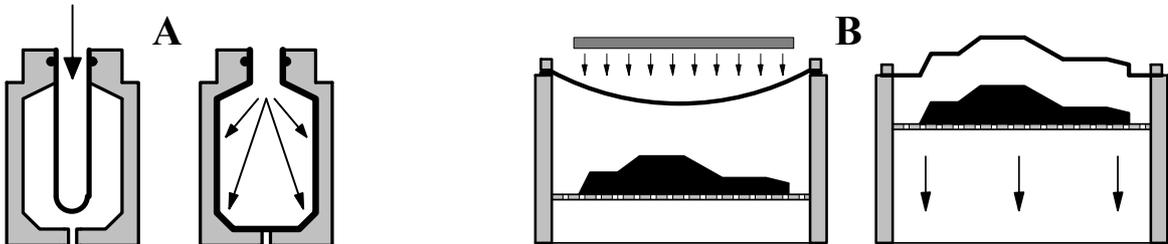
- (a) (i) Describe the differences between **any two** of the following joining processes:  
Gas welding, Adhesive bonding, Arc welding.
- (ii) Suggest **one** suitable application for **each** process selected at 4(a)(i).
- (b) Explain, with the aid of suitable diagrams, how the following oxy-acetylene flames are produced:  
(i) Neutral flame, (ii) Carburising flame, (iii) Oxidising flame.
- (c) Explain **any three** of the following in relation to soldering:  
(i) Tinning, (ii) Flux, (iii) Capillary action, (iv) Oxides.
- (d) Why is it essential to wear protective equipment when welding?



**Question 5.**

**(45 marks)**

- (a) (i) Name the following plastic moulding processes shown at **A** and **B** below.

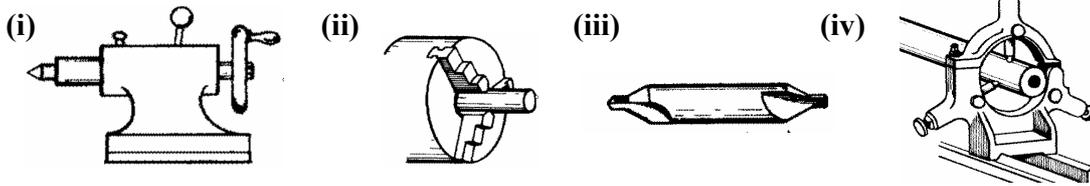


- (ii) Describe **any one** of the plastic moulding processes named at 5(a)(i) and identify **one** component produced.
- (b) Identify **two** safety precautions to be observed when cutting acrylic sheet.
- (c) (i) With the aid of a diagram, explain the operation of a plastic dip coating tank.  
(ii) Suggest **one** suitable application for plastic dip coating.
- (d) Identify, as either thermosetting or thermoplastic, the type of plastic used in the manufacture of **each** of the following:  
(i) Lunch box, (ii) Saucepan handles.

**Question 6.**

**(45 marks)**

(a) Identify **any three** of the lathe parts shown:



(b) (i) Describe, using sketches, **any one** of the following lathe turning operations:

Taper turning,

Knurling,

Drilling.

(ii) State **two** safety precautions to be observed for the turning operation selected at **6(b)(i)**.

(c) State **two** reasons why a lathe cutting tool must be set on centre before machining.

**OR**

(c) Explain **any two** the following terms in relation to a CNC lathe:

(i) Emergency stop,

(ii) Simulation,

(iii) Stepper motor.

**Question 7.**

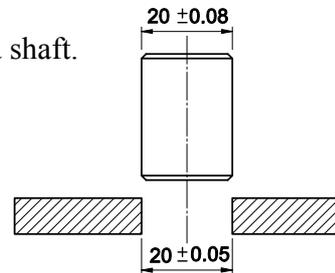
**(45 marks)**

(a) State **any two** ways of *accurately* measuring the diameter of a shaft.

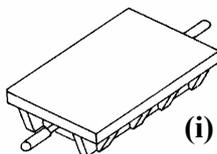
(b) A hole and shaft are produced to the dimensions shown.

State the:

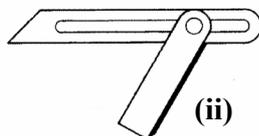
- (i) Nominal diameter of the hole;
- (ii) Largest diameter of the shaft;
- (iii) Smallest diameter of the hole;
- (iv) The type of fit which will result from the assembly of the largest shaft and smallest hole.



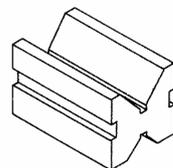
(c) Name and give **one** application for **any three** of the instruments shown.



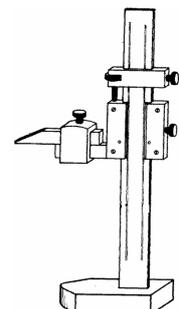
(i)



(ii)



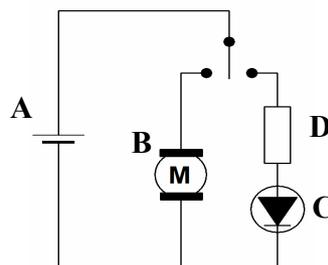
(iii)



(iv)

**OR**

(c) Name **any three** of the electronic symbols labelled A, B, C and D in the circuit diagram.



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